



TSEN2 gene

tRNA splicing endonuclease subunit 2

Normal Function

The *TSEN2* gene provides instructions for making one part (subunit) of an enzyme called the tRNA splicing endonuclease complex. This complex helps process several types of RNA molecules, which are chemical cousins of DNA.

The tRNA splicing endonuclease complex is particularly important for the normal processing of a form of RNA known as transfer RNA (tRNA). tRNA molecules help assemble protein building blocks called amino acids into full-length proteins. However, before they can assemble proteins, tRNAs must be processed into mature molecules. In particular, regions called introns need to be removed from some tRNAs for the molecules to be functional. The tRNA splicing endonuclease complex recognizes and then removes introns to help produce mature tRNA molecules.

Studies suggest that the tRNA splicing endonuclease complex may also be involved in processing another form of RNA known as messenger RNA (mRNA). mRNA serves as a genetic blueprint for making proteins. Researchers suspect that the tRNA splicing endonuclease complex cuts (cleaves) one end of mRNA molecules so a string of adenines (one of the building blocks of RNA) can be added. This process is known as polyadenylation, and the string of adenines is known as a poly(A) tail. The poly(A) tail signals the stopping point for protein production and protects mRNA from being broken down before protein production occurs.

Health Conditions Related to Genetic Changes

pontocerebellar hypoplasia

At least four mutations in the *TSEN2* gene have been identified in people with a disorder of brain development called pontocerebellar hypoplasia. The major features of this condition include delayed development, problems with movement, and intellectual disability. *TSEN2* gene mutations cause a small percentage of all cases of a form of the disorder designated pontocerebellar hypoplasia type 2 (PCH2). When PCH2 results from *TSEN2* gene mutations, it is sometimes categorized more specifically as PCH2B.

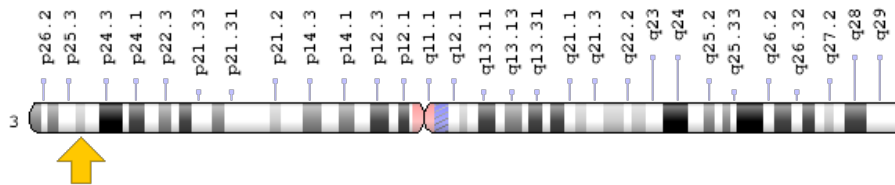
The *TSEN2* gene mutations that cause PCH2B impair the function of the tRNA splicing endonuclease complex, which likely disrupts the processing of RNA molecules and affects the production of many types of proteins. Before birth, these changes appear to have the most severe impact on fast-growing tissues, such as those in the brain. However, it is unknown exactly how reduced function of the tRNA

splicing endonuclease complex leads to abnormal brain development in people with this condition.

Chromosomal Location

Cytogenetic Location: 3p25.2, which is the short (p) arm of chromosome 3 at position 25.2

Molecular Location: base pairs 12,484,432 to 12,539,624 on chromosome 3 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- HsSen2
- MGC2776
- MGC4440
- SEN2
- SEN2_HUMAN
- SEN2L
- tRNA-intron nuclease 2
- tRNA splicing endonuclease 2 homolog (*S. cerevisiae*)

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): From RNA to Protein
<https://www.ncbi.nlm.nih.gov/books/NBK26829/>
- Molecular Biology of the Cell (fourth edition, 2002): Structure of a tRNA-splicing endonuclease docked to a precursor tRNA (figure)
<https://www.ncbi.nlm.nih.gov/books/NBK26829/?rendertype=figure&id=A1060>
- The Cell: A Molecular Approach (second edition, 2000): Processing of mRNA in Eukaryotes
<https://www.ncbi.nlm.nih.gov/books/NBK9864/#A1031>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28TSEN2%5BTIAB%5D%29+OR+%28tRNA+splicing+endonuclease%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D>

OMIM

- tRNA SPLICING ENDONUCLEASE 2, S. CEREVISIAE, HOMOLOG OF
<http://omim.org/entry/608753>

Research Resources

- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=TSEN2%5Bgene%5D>
- HGNC Gene Family: tRNA-splicing endonuclease subunits
<http://www.genenames.org/cgi-bin/genefamilies/set/776>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=28422
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/80746>
- UniProt
<http://www.uniprot.org/uniprot/Q8NCE0>

Sources for This Summary

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